REQUIREMENTS FOR AN ILS PROGRAM 38

DODD 5000.39 11/17/83

• SYSTEM READINESS IS A PRIMARY OBJECTIVE OF THE ACQUISITION PROCESS. IT IS DOD POLICY TO ENSURE RESOURCES TO ACHIEVE READINESS RECEIVE THE SAME EMPHASIS AS THOSE REQUIRED TO ACHIEVE SCHEDULE AND PERFORMANCE OBJECTIVES.

• ACQUISITION PROGRAMS SHALL INCLUDE AN ILS PROGRAM THAT BEGINS AT PROGRAM INITIATION AND CONTINUES FOR THE LIFE CYCLE OF THE SYSTEM.

• PRIMARY OBJECTIVE OF ILS PROGRAM -
ACHIEVE SYSTEM READINESS,
AT AFFORDABLE LIFE CYCLE COST.

38. This brings us to the requirements for an ILS program. This statement is true for every user of mechanical or electronic equipment: "I need to be able to turn the equipment on and use it when I need it for as long as I need it." Is a sailor satisfied with a more powerful, higher resolution sonar system if it is not ready to use when he turns it on? No. Is a house wife satisfied with her washer, dryer, stove or hair drier if when she needs it, she tries to turn it on but it is not immediately ready to use? No. Is a UPS driver satisfied if he is provided with a new delivery truck equipped with Global Positioning System, if he loads up and turns the ignition switch, but the truck is not ready to go? No.

38. Here is the US Department of Defense ILS requirements statement. An ILS program is as important as the ON/OFF switch of a small appliance or a complex system, so you can turn it on when you need it. Need is the same as requirement. Performance and delivery schedule are not more important than readiness; so planning for READINESS needs to begin early during the design process, when planning for PERFORMANCE begins. Equipment that is always ready to perform when needed is less expensive to operate and maintain.

39. Even though these documents are 10-13 years old and have been updated, the wisdom in them is still for us today. Effective program management schedules, and balancing and coordinating the use of money and personnel between product performance and readiness planning. The new DoD Regulation 5000.2-R redefines performance to include all the ILS elements, and includes Supportability Analysis in early Systems Engineering where it belongs. 5000.2-R reduces the identity boundary between engineering and hardware logistics, causes them to be considered as parts of a cooperative, comprehensive effort of designing for cost effective supportable performance program, and adds program risk assessment.

NAVY - OPNAVINST 5000.49A 1/30/87 39
AIR FORCE - Memo for all Commands 10/17/84
ARMY - Commander's Guidance Statement (No 32) 6/9/86

System readiness is the final measure of effectiveness and is a primary objective of the acquisition process.
Resources to achieve readiness shall receive the same emphasis as those required to achieve schedule and performance objectives.
The ILS program and products shall be formally tested and verified, and operational logistics test parameters shall be part of the TEMP.
Balance the use of dollars by the sponsor among performance and supportability design thresholds, schedule limitations and out year support costs.

DoD 5000.2-R 3/15/96
¶ 4.2 ... simultaneously optimize the product and its manufacturing and supportability to meet cost and performance objectives. It is critical that the processes used to manage, develop, manufacture, verify, test, deploy, operate, support, train people, and eventually dispose of the system be considered during program design.

40. The person who manages the efforts of planning and providing logistics support for a weapon system may actually do more work over a longer portion of the system life cycle than any other person, unless the program manger (usually a Navy Captain or equivalent for other services) stays with the system for several 3 or 4 year terms.

In Soviet military industrial programs, the program manager was the logistics manager who was held accountable during the design process for the support and readiness of his aircraft or tank during its entire service life. But, their emphasis on military logistics turned out to have a negative effect on their subsistence logistics.

41. Here is a simplified organizational chart of the U.S. Department of Defense. This is basically similar to any industrial or commercial corporation. The Sponsors, upper level management in the Pentagon, help determine requirements of our military service personnel (customers or users) so they can do their jobs of national defense and providing support to other nations (more on this later). They sponsor the various Army, Navy, Air Force, and Marine programs for weapon system development, testing, production and support.

ILS MANAGER - OPNAVINST 5000.49A 40

PARA. 6D(1) FUNCTIONAL TITLE ... OF ONE WHO HOLDS PRIMARY RESPONSIBILITY FOR THE LOGISTICS PROGRAM, BOTH PLANNING AND IMPLEMENTATION ... AND INTEGRATION FOR OTHER PARTS OF THE [ORGANIZATION] ...

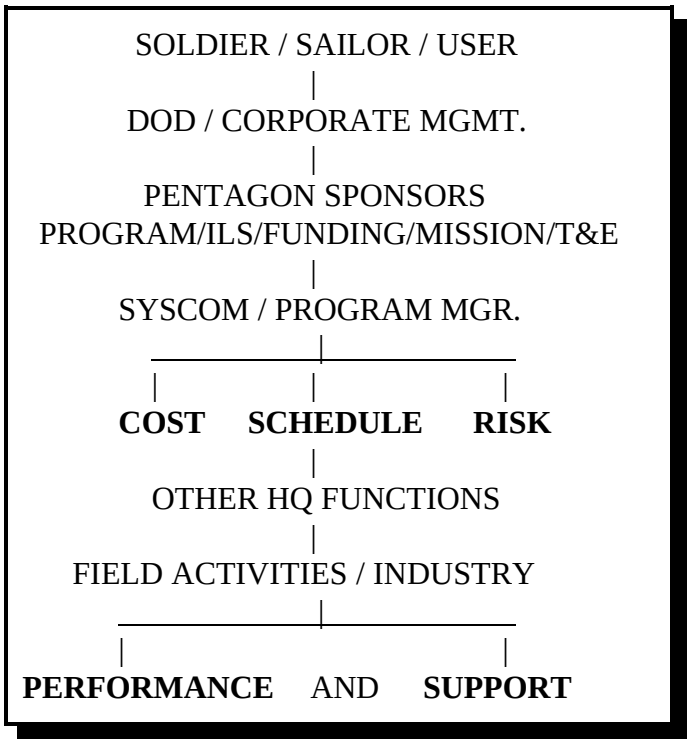
MUST PERFORM MORE WORK ON THE SYSTEM AS A WHOLE THAN ANY OTHER SINGLE INDIVIDUAL ...

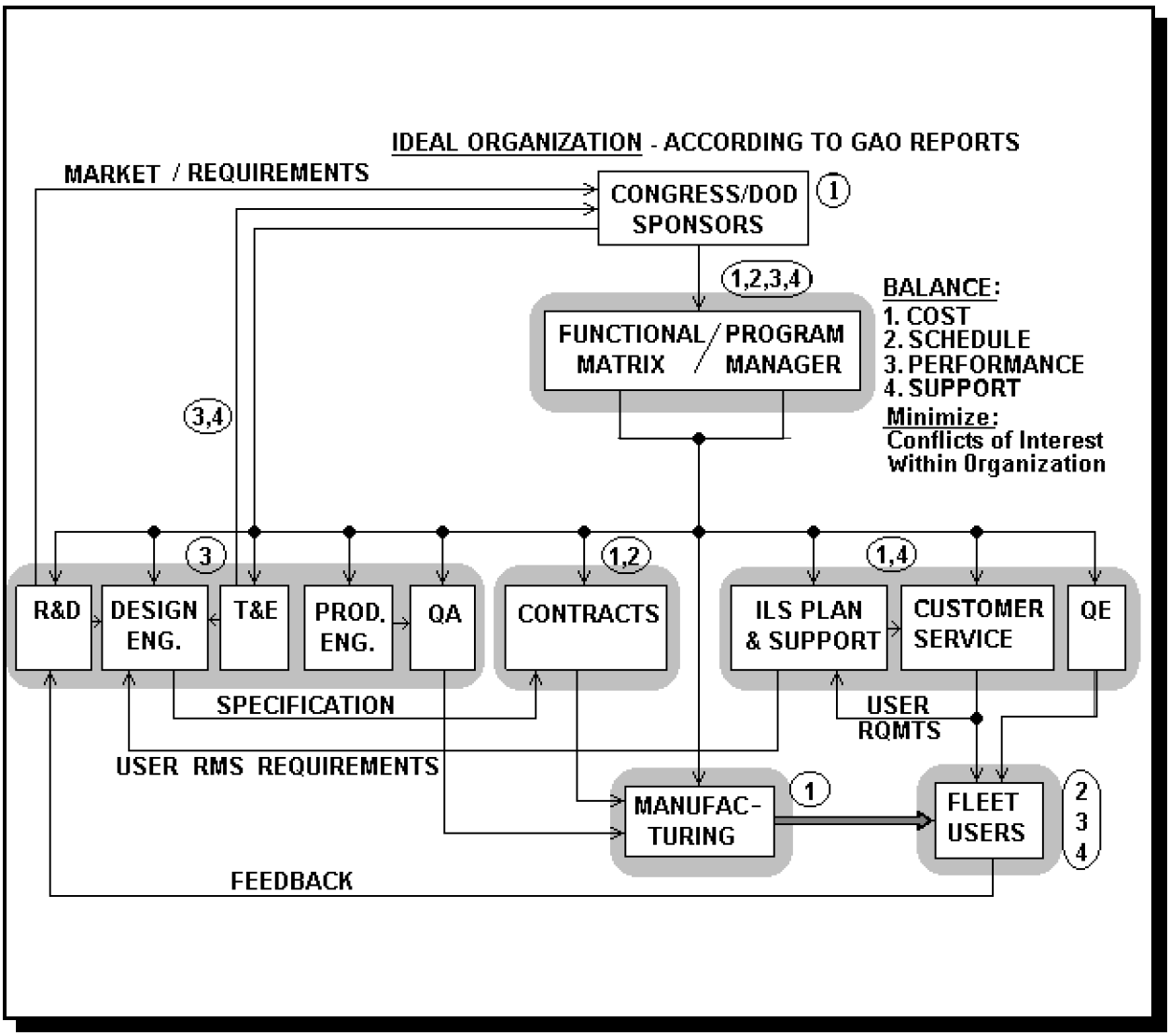
PARA. 6D(4) ILS MANAGERS AND OTHER PROFESSIONAL LOGISTICS PERSONNEL SHALL BE AFFORDED EQUALITY WITH OTHER PERSONNEL ENGAGED IN OTHER EQUALLY IMPORTANT AREAS OF ACQUISITION SUCH AS DESIGN ENGINEERING, PRODUCTION, CONTRACTS MANAGEMENT, FINANCIAL MANAGEMENT, ...

The Program Managers then plan what is required to develop, produce and support new systems, and they determine how many people are required at various headquarters functional areas and field activities to do the work. The four main areas of concern for Program Managers, as we saw earlier, are overall life cycle cost, schedule, risk, and performance/ support of the new system. They submit their planned annual budgets to their Pentagon sponsors.

These sponsors combine the budgets for all programs and submit to the Congress and then to the President. When they begin receiving their funding, the managers send funded task statements to their program team members, and the work begins. Periodically they report progress back to their sponsors and make plans for additional funds if required.

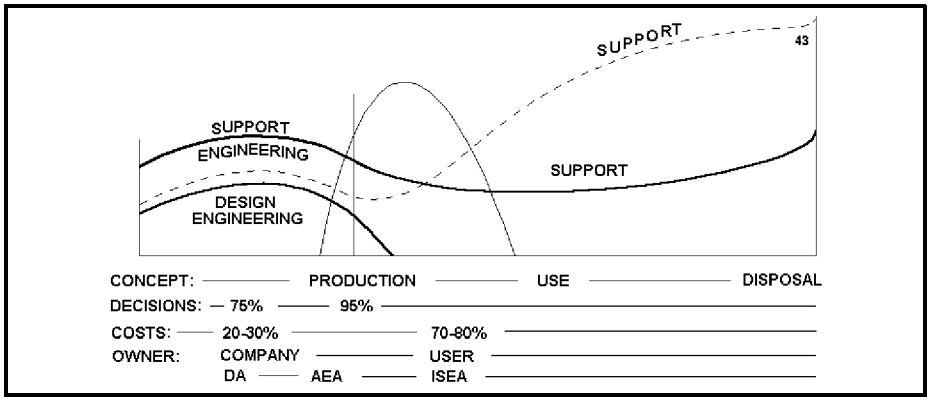
42. While working in the NAVAIR program office, I had an opportunity to study Government Accounting Office reports. Some programs seemed to start out OK, but failed during the production/deployment phase, to deliver operational and supportable systems or the required support resources. In addition to lack of required funding and requirements that were overcome by events, there were several categories of problems (mentioned earlier), including poor management, inadequate testing, and dis-integrated logistics support planning. Here is a Vu-Graph on the subject of management analysis. This shows more of a broad corporate picture, with the various departments highlighted according to their main motivating concern, whether cost, schedule, performance or support. Limited funds and personal or professional motivation are the main reason why it is so important for these four elements to be properly balanced. They frequently conflict and compete with each other for limited funds and need to be managed by one manager.





Consider a government technician, very concerned about equipment performance, but whose program manager is motivated more by schedule and is therefore more concerned with delivering equipment to the user on schedule; because it makes the program look good. Suppose the technician oversees testing of production lot samples (for example, 25 units out of a production lot of 500) and their performance is just barely below acceptable standards. The technician may earnestly desire to write an accurate test report and submit it to his boss and to the manufacturer. Reworking the lot and retesting and accepting another sample would be at the manufacturer's expense and would delay delivery to the users by several months. The technician could be under pressure from his boss and from the company president to just go ahead and accept the lot so it can be delivered on time and save the company money. This in fact has happened many times and is the reason why poor quality, unsupportable equipment and systems have been delivered to users. And this is the reason why an organizationally independent test agency was established above the program manager, to reduce or eliminate this biasing of test results.

43. About 1/4 of the life cycle cost of any program is normally spent on design, testing and production and about 3/4 after production on distribution, use, maintenance and disposal. Engineering used to be viewed only as an activity to design performance and reliability into equipment.



These are both good. But true system engineering includes designing for <u>performance, reliability, readiness and support</u>. After production, performance and reliability don't cost very much; but the logistics support, that is, the combined cost of distribution, storage, use, maintaining good performance, and disposal turns out to be the most expensive part of the program. When engineering only designs for performance with little support planning (see dashed Support profile line), the cost of maintaining that performance will be greater, resulting in more frequent repairs more expensive parts, delays...etc. On the other hand, the more money spent up front for readiness and support planning (see heavy Support profile line), the more effective and less costly the support is during equipment distribution, use and maintenance.

As stated earlier, one leader should manage all four program concerns, and none of them should be directly accountable to another. Now consider, for example, what would happen if the design engineer, whose main motivation is designing for equipment <u>performance</u>, and the loggie, whose main motivation is planning for <u>support</u>, were both made accountable to a Program Manager who was a budget analyst and whose decisions are motivated by thrift in the use of funds? For example, the engineer submits a short term budget for system design and the loggie submits a long term budget for developing logistics support resources. The total funding is very limited. If the engineer runs into a cost overrun situation (he needs more money to complete his design), the manager may show partiality to the engineer's need and use some of the loggie's funding, thinking the loggie can do his work later on with his long-term support funding. It would be better for the manager to balance the engineer's and loggie's budget requirements, possibly causing a small delay in design and production schedule, but enabling a concurrent development of design with performance and support.

What about a program team with a tight wad <u>budget</u> person, a timid <u>engineer</u>, an aggressive <u>loggie</u>, and a program manager who used to be a field support manager and is mainly concerned about <u>support</u>. When budget planning time comes, the manager and budget analyst may compare the engineer's large near-term dollar requirement with the loggie's small near term ILS and large far term requirements. If funding is very limited, they may reduce the engineer's development budget to save near term money and let the loggie have a larger percentage. This may result in production and delivery of equipment that is easy to fix, but that doesn't perform as well as required because the engineer's effort to design for performance was not complete. Again, it would have been better for the manager to balance the funding between performance and support. The readers are invited to consider all possible variations of who's working for whom. What prejudices could develop if one member of a program team, specializing in one of those four main program concerns, is accountable to another member or to a manager who is motivated by just one of those concerns? The bottom line is this, managers who understand the importance of balancing <u>cost, schedule performance and support</u> are better managers.

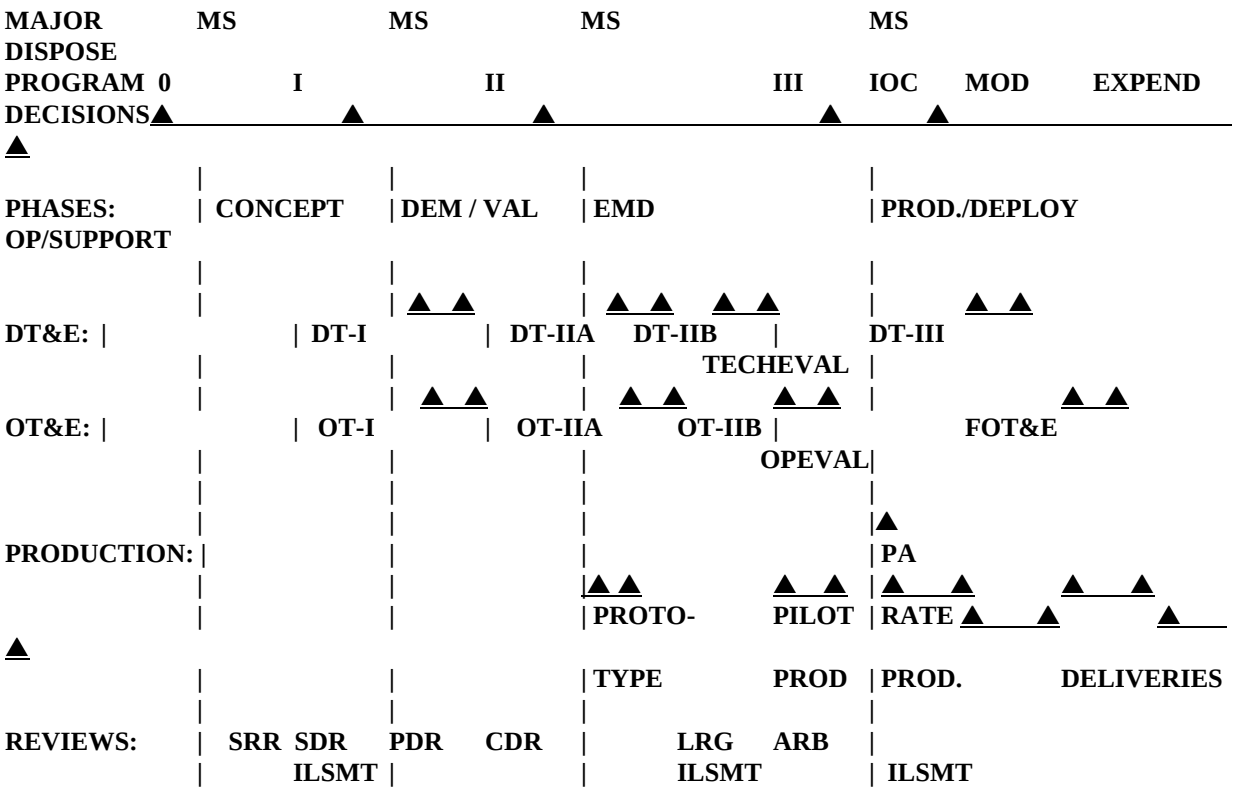
44. Planning that a Program Manager does is according to a standard schedule called the Acquisition Cycle. It is organized into four main phases. In order for the program to advance from one phase into the next, it must pass a Milestone, which is like a student passing a test in order to go the next grade. These Milestones and Phases are: Milestone-0, Concept Study Approval - this begins Concept Exploration and Definition Phase; Milestone I, Concept Demonstration Approval (was called Research and Development or

R&D) - this begins the Demonstration Validation Phase; and Milestone II, Development Approval - this begins the Engineering and Manufacturing Development Phase. Milestone III, Production Approval begins the Production and Deployment Phase, which leads into the Operations and Support Phase and ends with Disposal/reutilization. These two phases can last from 10 to 50 years.

Throughout the Acquisition Cycle there are many test and evaluation (T&E) phases. Two types of testing are done in parallel - Development Test and Evaluation shows how well the new system operates under ideal circumstances, in a scientific laboratory by the people who helped to develop the new equipment. This is when performance is tested by engineering and technical personnel from contractor and field activities. Then Operational T&E demonstrates how well it operates in field conditions and how suitable it is for the users (operation and maintenance personnel). This is when performance and support are tested and evaluated together by personnel having the same skill levels as the intended users. Early phases of Operational Testing are usually OT&E personnel observing DT&E tests. Prior to the decision to enter into full production, there is a final Technical Evaluation and then an Operational evaluation, when performance, readiness and logistics supportability are tested. There are many formal reviews to evaluate the status of design and configuration management.

Also there are several dozen documents that need to be developed by Program Management Office and various activities, to communicate various aspects of the overall Program to various groups of people. These include a Program Management Plan, Annual Budget, ILS Plan, Configuration Management Plan, LSA Plan, System Performance Specifications, Software Specs, Test and Evaluation Master Plan, Acquisition Plan, Statement of Work and Contract. Recently these documents have been combined into one, and automated as a Master Acquisition Program Plan (MAPP). MAPP incorporates the common paragraphs from all the single documents into one summary section (like a System Description) and having sections dealing with the specific areas like performance, support, test, CM, LSA...). During all program phases, at reviews and Milestones, decisions are made that will influence the future design, operation, support and life cycle cost of the system.

DOD INTEGRATED PROGRAM MANAGEMENT SCHEDULE 44

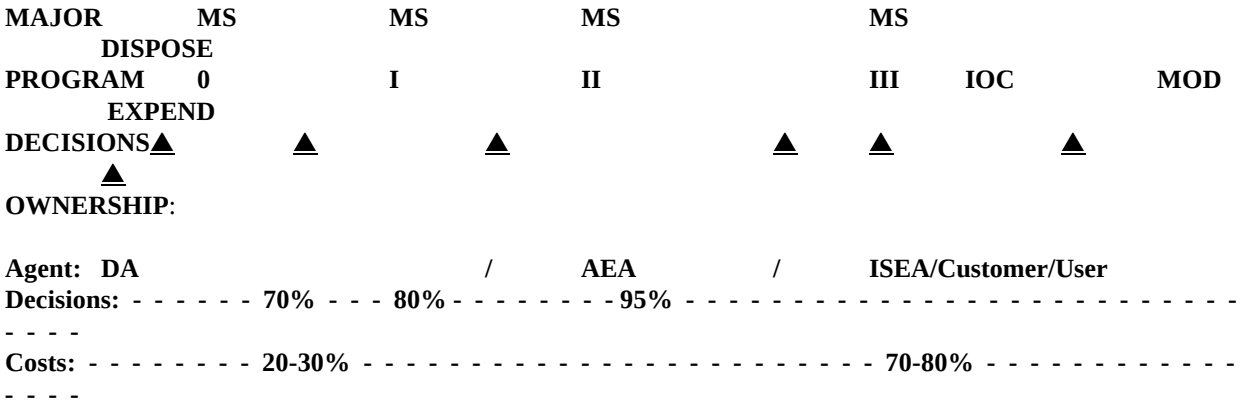


| | | | |
PM DOCUMENT: OR DOP ILSP TEMP | (UPDATES) |
| LSA | | |
| | SOW | PR CONT. | CONTRACT
ACQUISITION: | SPEC. ACQ PLAN ILSDS | RFP EVAL | AWARD
| (Updates for each phase) | |

44a. Here is a list of acronyms and abbreviations used on the previous Vu-Graph:

AEA ACQUISITION ENGINEERING AGENT
ARB ACQUISITION REVIEW BOARD
CDR CRITICAL DESIGN REVIEW
DA DESIGN AGENT
DEM/VAL DEMONSTRATION & VALIDATION
DT DEVELOPMENT TESTING
DT&E DEVELOPMENT TEST AND EVALUATION
EMD ENGINEERING / MFG / DEPLOYMENT
FOT&E FOLLOW-ON TEST AND EVALUATION
ILSDS ILS DETAIL SPEC
ILSMT ILS MANAGEMENT TEAM
IOC INITIAL OPERATIONAL CAPABILITY
ISEA IN-SERVICE ENGINEERING AGENT
LRG LOGISTICS REVIEW GROUP
LSA LOGISTICS SUPPORT ANALYSIS
MOD MODIFICATION OR UPGRADE
MS MILESTONE
OPEVAL OPERATIONAL EVALUATION
OR OPERATIONAL REQUIREMENT
OT OPERATIONAL TESTING
OT&E OPERATIONAL TEST AND EVALUATION
PA PRODUCTION APPROVAL
PDR PRELIMINARY DESIGN REVIEW
PR PROCUREMENT REQUEST
RFP REQUEST FOR PROPOSAL
SDR SYSTEM DESIGN REVIEW
SOW STATEMENT OF WORK
SRR SYSTEM READINESS REVIEW
TECHEVAL TECHNICAL EVALUATION
TEMP TEST AND EVALUATION MASTER PLAN

45. To continue the thought from the previous paragraph, the majority (over 90%) of design and funding decisions are made before production and before the user gets to own and operate the equipment; but the majority of money spent on most large programs (about 70%) is after production, or during Operation and Maintenance (also called ownership) phase. This means the earliest decisions affect the majority of the money spent on the program. Early decisions are easy to make and have long term effects. So early decisions should be made very carefully, with distribution, operations, maintenance, user and system support, and equipment end of service life in mind. Again, the main purpose of these decisions is to increase readiness and service life while reducing the ownership cost.



After later phases of development, especially after production, decisions about equipment design and support become more costly because there are more people involved and delays and design changes are more costly. Furthermore, as the program advances through the acquisition phases, there is a shift of responsibility from the Program Manager and Design Engineer Agent, to the PM and Acquisition agent (contracting), and finally to the Owner and In-service Engineer Agent. These are the activities that manage and provide the logistic support for the system and its users during the Operation and Maintenance phase. Many times, it is the In-Service Engineers or customers that get stuck with the very expensive and embarrassing task of solving problems and correcting mistakes made by managers and engineers who didn't plan for support during the earlier planning phases.

In the past, important decision were made in series; that is, decision makers responsible during earlier phases would make decisions based only on their own immediate concerns (like design, testing, contracting), and based on the funding available to them. During the next phase, new decision makers made their decisions based on their concerns (like production, training, use, maintenance, disposal). This serial decision-making can lead to schedule delays and additional costs because sometimes the next decision-making team adds new features or changes previous decisions. A solution to this inefficiency is "Concurrent Engineering," having all the decision makers who are concerned with all future life cycle program phases, meet in a room or over a computer network (Teleconference). During earlier program phases it is less expensive to get a group of 5-10 life cycle decision makers together ($10-20K) than it is to wait and make those decisions later when design changes can cause months or years of costly delay (costing $M's). The cost leverage ratio alone could be $20,000/$2,000,000 or about 1/200. Therefore, more support planning funded during design engineering may lower the support costs.

Also, please note that some manufacturers and businesses are willing to sell what may appear to be less expensive products than their competition, for the purpose of making larger profits during ownership phase, when the user has to depend on them for more expensive parts and services. In other words, some use this principle of cost distribution (30% during development and 70% during support) to take unfair advantage of their customers. This kind of business that can grieve a loggies' heart if he is concerned about customer satisfaction.

46. This schedule is a tool that I used to develop a logistics program for sonobuoys. It can be used to start or improve an ILS effort in any program where support and readiness need more emphasis. First, I identified the logistics elements for each sonobuoy and documented them in an ILS Plan outline. I listed all the test phases, program reviews, and program management, acquisition and technical documents, and plotted their past and future occurrences along a schedule. Next, I read the written account of each test and review, and studied all the program documents to determine how much logistics had been considered. Where product and user support issues had not been given enough attention, I made arrangements to supply additional ILS information at the next program review or to the next document revision, and documented these actions in the ILS Plan.

PROGRAM SCHEDULE FORM

| FY83 | FY84 | FY95 | FY96 | FY97 | FY98 |

| ONDJFMAMJJASONDJFMAMJJASONDJFMAMJJASONDJFMAMJJASONDJFMAMJJASONDJFMAMJJASOND |

| **EVENTS** | 1983 | 1984 | 1995 | 1996 | 1997 | 1998 |

| **PM/T&E/ILS** |

| MS-0 |

| MS-I |

| DT/OT-I |

| MS-II |

| DT/OT-II |

| TECHEVAL |

| OPEVAL |

| MS-III |

| AFP |

| **MEETINGS** |

| **CM/ILS** |

| PMR |

| OR/TOR |

| SDR |

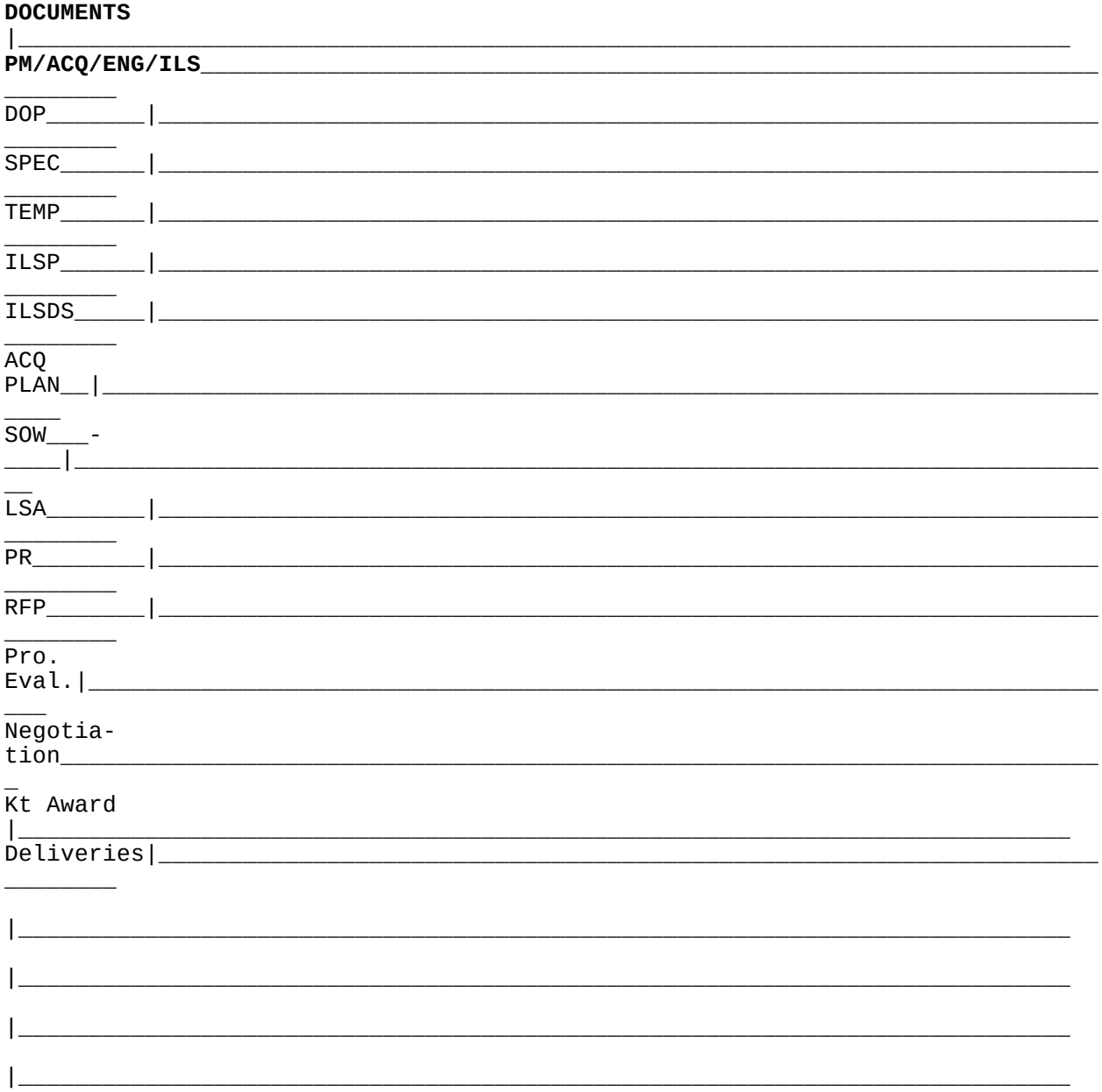
| PDR |

| CDR |

| ILSMT |

| LRG |

| ARB |


DOCUMENTS
PM/ACQ/ENG/ILS
DOP
SPEC
TEMP
ILSP
ILSDS
ACQ PLAN
SOW
LSA
PR
RFP
Pro. Eval.
Negotia-tion
Kt Award
Deliveries